



MODELLO SCHEDA INSEGNAMENTO

Corso di Laurea	Scienze Geologiche
Denominazione insegnamento:	Physics of the Earth
Numero di Crediti:	8
Semestre:	I
Docente Titolare:	Raffaella De Matteis
Dottorandi/assegnisti di ricerca che svolgono attività didattica a supporto del corso:	
Orario di ricevimento:	
Indirizzo:	

PRESENTATION OF THE COURSE

The Earth Physics course deals mainly with the Earth's internal structure, earthquakes, natural fields associated with the Earth and the main investigation methods. The course contributes to the understanding of geodynamic processes with particular attention to earthquakes.

KNOWLEDGES AND SKILLS

The Earth Physics course aims to provide the basic elements for knowledge of the physical properties of the solid Earth. The student will learn the theory of plate tectonics, the characteristics of the natural fields (gravitational field and magnetic field) associated with the Earth and the fundamental elements of earthquake seismology. He will be able to analyze seismograms for estimating earthquake location, focal mechanism and magnitude. The student will use softwares for seismic analysis.

REQUIREMENTS

Basic knowledge in Mathematics and Physics.

ATTENDANCE

The attendance at the course is recommended because the student will benefit from classroom exercises, which will enable him to apply knowledge to solve problems.

CONTENTS

Earth's age. Earth's gravity field. Earth's magnetic field. The magnetic properties of rocks. Seismic waves propagation. Earthquake seimology. The Earth's heat. Plate Tectonics: geophysical constraints.

TEACHING METHODS

The course consists of lectures for the transmission of knowledge and exercises for the practical application of knowledge and understanding skills, learning from oneself and solving problems.

BOOKS

1. Lowrie W. - Fundamentals of Geophysics. Cambridge University Press, 1997.
2. Gasparini P. , M.S.M. Mantovani - Fisica della Terra Solida. Liguori Editore, 1984.
3. Lillie R.J. - Whole earth geophysics. Prentice Hall
4. Zollo A., A. Emolo - Terremoti e onde. Metodi e pratica della sismologia moderna. Liguori Editore. Fowler C.M.R. - The solid Earth. Cambridge University Press, 1990

EXAM

The exam consists of a final oral examination. The exam will examine the knowledge of the topics covered in the course, the clarity of exposure and the scientific-technical language.

EXAMS SCHEDULE

Rinvio al link

ENROLL FOR EXAMS

Rinvio al link

SYLLABUS

Argomenti	Ore	Riferimenti bibliografici	Tipologia di lezione
Major divisions of the Earth. Plate Tectonics: geophysical constraints.	2	3	frontale
Earth's age. Isotopes, radioactive decay, accumulation clocks.	2	1, 2, 5	frontale
Gravity: the law of universal gravitation, the earth's figure, gravitational potential and acceleration of the spheroidal Earth, normal gravity, the geoid, measurement of gravity, correction of gravity measurements (free-air, topographic, Bouguer plate correction) gravity anomalies, regional and residual anomalies, interpretation of gravity anomalies, Isostasy, gravity modeling, examples for italian region.	20	1, 2, 3	frontale
Earth's magnetic field: separation of the magnetic fields of external and internal origin, axial dipolar model, temporal and spatial variations, the magnetization of the Earth's crust, interpretation of magnetic anomalies, origin of the magnetic field,	12	1, 2, 3	frontale

paleomagnetic studies.			
Seismology and the internal structure of the Earth: elements of elasticity theory, seismic waves, earthquake seismology, earthquakes and plate tectonics, earthquake location, focal mechanism, earthquake size, earthquake frequency, seismic rays in a uniformly layered Earth, the ray parameter, inversions of travel-time vs distance curves, radial variations of seismic velocities, models of the Earth's internal structure, stress field, the seismicity in Italy.	20	1, 2, 4, 5	frontale
Heat within the Earth, sources of heat, heat transfer, heat flow across Earth's surface, tectonics and heat flow.	4	3	frontale
Exercises	12		esercitazione